

CLAIMS

What is claimed is:

- 1 1. A method of producing nitride based heterostructure devices comprising the
2 steps of:
3 providing a substrate;
4 applying a first layer over the substrate wherein the first layer includes
5 nitrogen; and
6 applying a dielectric layer over the first layer wherein the dielectric layer
7 includes silicon dioxide.
- 1 2. The method of claim 1, wherein the substrate includes one of the group
2 comprising sapphire, silicon carbide, a spinel substrate and silicon.
- 1 3. The method of claim 1, wherein the first layer further includes a binary
2 compound including one element of the group comprising group III elements.
- 1 4. The method of claim 1, wherein the first layer further includes a ternary
2 compound including two elements of the group comprising group III elements.
- 1 5. The method of claim 1, wherein the first layer further includes a quaternary
2 compound including three elements of the group comprising group III elements.

1 6. The method of claim 1, further comprising applying a second layer between
2 the first layer and the dielectric layer wherein the second layer includes nitrogen.

1 7. The method of claim 6, wherein the first layer further includes a binary
2 compound including one element of the group comprising group III elements and
3 the second layer further includes a ternary compound including two elements of
4 the group comprising group III elements.

1 8. The method of claim 6, wherein the first layer further includes a ternary
2 compound including two elements of the group comprising group III elements
3 and the second layer further includes a quaternary compound including three
4 elements of the group comprising group III elements.

1 9. The method of claim 1, further comprising:
2 applying a first and a second ohmic contact to the first layer; and
3 applying a gate contact to the dielectric layer.

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1 10. A method of producing nitride based heterostructure devices comprising the
2 steps of:

3 providing a substrate;

4 applying a first layer over the substrate wherein the first layer includes
5 gallium and nitrogen; and

6 applying a dielectric layer over the first layer wherein the dielectric layer
7 includes silicon dioxide.

1 11. The method of claim 10, wherein the substrate includes one of the group
2 comprising of sapphire, silicon carbide, a spinel substrate and silicon.

1 12. The method of claim 10, further comprising applying a second layer between
2 the first layer and the dielectric layer wherein the second layer includes
3 aluminum, gallium and nitrogen.

1 13. The method of claim 12, wherein the substrate includes one of the group
2 comprising sapphire, silicon carbide, a spinel substrate and silicon.

1 14. The method of claim 12, wherein the first layer further includes aluminum
2 and the second layer further includes indium.

1 15. A nitride based heterostructure device comprising:

2 a substrate;

3 a first layer over the substrate wherein the first layer includes nitrogen;

4 and

5 a dielectric layer over the first layer wherein the dielectric layer includes

6 silicon dioxide.

1 16. The device of claim 15, wherein the substrate includes one of the group

2 comprising sapphire, silicon carbide, a spinel substrate and silicon.

1 17. The device of claim 15, wherein the first layer further includes gallium.

1 18. The device of claim 15, further comprising a second layer positioned between

2 the first layer and the dielectric layer wherein the second layer includes nitrogen.

1 19. The device of claim 18, wherein the second layer further includes aluminum

2 and gallium.

1 20. The device of claim 18, wherein the second layer further includes indium.

1 21. The device of claim 18, wherein a composition of the first layer changes over

2 distance and a composition of the second layer changes over distance.

1 22. The device of claim 18, wherein a composition of the first layer remains
2 substantially constant over distance and a composition of the second layer
3 remains substantially constant over distance.

1 23. The device of claim 15, wherein the device is used as one of the group
2 comprising a photodetector, a field effect transistor, a gated bipolar junction
3 transistor, a gated hot electron transistor, a gated heterostructure bipolar junction
4 transistor, a gas sensor, a liquid sensor, a pressure sensor, a multi function sensor
5 of pressure and temperature, a power switching device and a microwave device.